

Utilizing the Robson 10-Group Classification System as an Audit Tool in Assessing the Soaring Caesarean Section Rates in Ibadan, Nigeria

Abstract

Background: The caesarean section (CS) is the most common operation performed globally with increased incidence worldwide. **Aim and Objectives:** Using the Robson 10-Group Classification System (RTGCS), we aimed to identify women who were the main contributors to the high CS rate (CSR) over a 3-year period at a foremost tertiary health facility. **Settings:** This study was conducted at the Department of Obstetrics and Gynaecology, University College Hospital, Ibadan, Nigeria. **Materials and Methods:** This study is a retrospective study of all women who delivered by CS at the University College Hospital, Ibadan, Nigeria from January 2017 to December 2019. Data were obtained using a structured proforma and women were categorized according to the RTGCS. Data were analysed using SPSS version 21. Descriptive statistics (frequency, percentage, mean) carried out were presented in tables. **Results:** The CSR was 46.9%. Women in Group 5 (parous women >37 weeks with previous CS and a single foetus in cephalic presentation), Group 1 (nulliparous women >37 weeks with a single foetus in cephalic presentation and spontaneous labour), and Group 10 (women <37 weeks with a single foetus in cephalic presentation) were major contributors to the CSR, with 30.9%, 17.7%, and 13.7%, respectively. Stillbirth rates were highest in Groups 10 (30.3%), 3 (24.4%), and 8 (16.8%). Apgar score <7 at the 5th minute was highest in Groups 5 (29.7%), 10 (17%), and 1 (16.6%). **Conclusion:** In a bid to reduce caesarean deliveries, efforts should focus on increasing the proportion of vaginal deliveries in these identified groups, especially in women with a history of one CS.

Keywords: Caesarean section, Ibadan, Robson classification, UCH

Introduction

The caesarean section (CS) is the most common operation performed globally. In most cases, it is lifesaving, however, it still has a considerable risk of numerous complications.^[1] Caesarean deliveries continue to increase globally.^[2,3] Even though it is effective in reducing maternal and neonatal mortality when medically indicated, the incidence of non-medical caesarean deliveries has increased.^[4] It is also discovered that nulliparous women may opt for CSs because they are worried, whereas multiparous women may make that decision after reflecting on their previous delivery experience.^[5] With an increasing number of women requesting for CS and more advocacy for women-centred delivery, maternal demand for CS has a significant influence on the rising rates.^[4,6]

There is a wide variation in the CS rate (CSR), ranging from 6% to 27.2%.^[7] This continuous rise is influenced by geographic disparities,

with median CSR much higher in medium- and high-income countries compared with low-income countries.^[7] The World Health Organization recommends optimal CSR of 10–15%, but an ecological study of CS in 194 WHO countries revealed that CSR of up to 19 per 100 live births was associated with lower neonatal or maternal mortality.^[8]

The prevalence of CS in Sub-Saharan Africa (SSA) has changed minimally from 2.3% to 3.5% over 24 years.^[4] These low figures reflect the high unmet needs and may be so due to the general aversion for CS in SSA.^[9] The Nigeria Demographic and Health survey (NDHS) in 2018 revealed the prevalence of CS to be 2%, with the Southwest region having the highest (7%) level of CS in the country.^[10] In some urban areas in Nigeria, the CSR is much more higher with rates of 40.1% and 42.5% recorded in Lagos, Nigeria.^[9,11]

Regular audits and feedback are essential in improving clinical practice.^[12,13] In 2001, Robson *et al.*^[5] proposed the adoption of a 10-Group Classification System (TGCS). This classification is reproducible and easily

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**Oluwasomidoyin
Olukemi Bello,
Adebayo Damilola
Agboola**

*Department of Obstetrics
and Gynaecology, College
of Medicine, University of
Ibadan/University College
Hospital, Ibadan, Oyo State,
Nigeria*

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Address for correspondence:

*Dr. Adebayo Damilola Agboola,
Department of Obstetrics and
Gynaecology, University College
Hospital, Ibadan, Oyo State,
Nigeria.
E-mail: agboolamd123@gmail.
com*

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implementable allowing for trend analysis and comparison among institutions, countries, and regions.^[5,14] It is a simple system that groups pregnant women who have CS according to their obstetric characteristics, providing a common starting point for further detailed analysis.^[5] In 2015, the WHO advocated its use as a global standard for assessing, monitoring, and comparing CSR within and between healthcare facilities.^[7,15] The Robson TGCS (RTGCS) has been used in many countries but only sparingly in low- and middle-income countries (LMICs) like Nigeria.^[16,17]

The objective of this study was to use the RTGCS to analyse the group(s) of women who contributed to the CSR in Ibadan, Nigeria. We also identified the distribution of stillbirths and Apgar score <7 at the 5th minute across the groups.

Materials and Methods

This study is a retrospective clinical audit of women who delivered by CS at the University College hospital, Ibadan, Nigeria from January 2017 to December 2019. The hospital, located in Ibadan which is the largest city in West Africa, serves as a referral centre providing specialist care to many pregnant women within and beyond South-west Nigeria.^[18] The labour ward delivers about 2000 women annually.

Data were retrieved from the labour ward theatre register and patients' medical records using a structured proforma and were categorized according to the RTGCS. The RTGCS is a simple classification system based on dividing all pregnant women into different groups on the basis of obstetric parameters including parity (nulliparous or multiparous), previous CS (yes or no), labour onset (spontaneous labour, induced labour, or pre-labour caesarean), pregnancy category at the time of delivery (single cephalic, single breech, single transverse/oblique lie, or multiple pregnancy), and length of the pregnancy at delivery (≥ 37 vs. < 37 weeks).^[5]

Gestational age was assessed using early dating ultrasound and/or last menstrual period. In cases with no early ultrasound and/or unknown last menstrual period, a combination of fundal height and second/third trimester ultrasound with a compatible estimated gestational age was used. Also, neonatal outcomes, birth weight, and Apgar score at the 5th minute of delivery were retrieved. The 5-min Apgar score is a useful guide of the response to resuscitation.^[19] For twin deliveries, only the first twin's outcome was taken into account. The data available did not allow us to differentiate between fresh and macerated stillbirths. Neonatal deaths that may have occurred after discharge were not captured in our study. The main outcome measures were the relative size and the contribution of each group to the overall CSR, primary and repeat CSR, and CSR of induced labour and neonatal distress.

Data were entered and cleaned using the Statistical Package for Social Sciences (SPSS) version 21. Descriptive statistics (frequency, percentage, mean) carried out were presented in tables and chart. Inferential statistics was done to assess the significant difference in the morbidity in each of the RTGCS groups in terms of stillbirth rate and prevalence of birth asphyxia.

It was preempted that there could be some missing data from the labour ward register or retrieval of medical records on account of the retrospective design. All missing or incomplete data were excluded from the analysis. The annual total deliveries were obtained from the labour ward delivery register.

The CSR for each year (number of CS in a year divided by the total deliveries in the year multiplied by 100) and relative (number of CS in a particular group divided by the total number of CS in the study period multiplied by 100) contributions were calculated and the results presented as percentages. The results are presented according to the Robson report table.

Table 1: Characteristics of the women who had caesarean births from 2017 to 2019 at the University College Hospital, Ibadan

Variables	Frequency (n=2673)	Percentage
Age (years)		
≤20	38	1.4
21–25	225	8.4
26–30	854	31.9
31–35	904	33.8
>35	652	24.4
Parity		
Nulliparous	1000	37.4
Multiparous	1673	62.6
Previous CS		
Yes	1006	37.6
No	1667	62.4
Gestational age		
<37 weeks	559	20.9
≥37 weeks	2114	79.1
Caesarean section in labour		
Yes	1580	59.1
No	1093	40.9
Category of caesarean section		
Elective	887	33.2
Emergency	1786	66.8
Foetal presentation		
Cephalic	2394	89.6
Breech	202	7.6
Others (oblique/transverse/unstable)	77	2.9
Number of neonates		
Single pregnancy	2535	94.8
Multiple pregnancy	138	5.2
Foetal outcome		
Alive	2554	95.5
Stillbirth	119	4.5
Birth weight at delivery (kg)		
<1.5	165	6.2
1.5–2.49	414	15.5
2.5–3.99	1936	72.4
≥4	158	5.9
Apgar score at 5 min (n=2554)		
<7	229	9.0
≥7	2325	91.0

Results

During the period of the study (2017–2019), there were 2673 caesarean deliveries out of the total 5696 deliveries giving a CSR of 46.9%. The total number of deliveries per year was 1993 in 2017, 1514 in 2018, and 2189 in 2019. Emergency CS accounted for two-thirds [1786 (66.8%)] of the surgeries, whereas 887 (33.2%) were elective CS. One thousand six hundred and sixty-seven (62.4%) women had no previous CS. The CSR was 53.0% in 2017, decreased to 52.8% in 2018, and a further decrease to 37.4% in 2019. The mean age of the women was 31.9 years with a range of 15–42 years. Many (62.6%) of the women were multiparous and 59.1% had their CS in labour. While about a fifth (20.9%) of the surgeries were performed on preterm (<37 weeks) gestations, majority (79.1%) of the CSs were done at term with babies weighing between 2.5 and 3.99 kg accounting for the majority (72.4%). About 1 in 10 of the babies had an Apgar score ≤ 7 at the fifth minute, whereas 4.5% of the babies were stillbirths [Table 1]. Group 9 (2.2%) contributed more to the decline in CSR observed in 2019, whereas Group 5 (28.4%) had the least contribution to the increased CRS [Figure 1].

Previous CS (37.6%), medical disorders in pregnancy (20.5%), prolonged/obstructed labour (13.5%), and malpresentation (9.3%) were the major indications for CS. Table 2 shows that the women in Group 5 (all multiparous women with at least one CS and a single cephalic pregnancy, ≥ 37 weeks gestation) were the highest contributors (30.9%) to the overall CSR. The second highest contributors were women in Group 1 (all nulliparous women with single cephalic, >37 weeks, spontaneous labour), with a relative contribution of 17.7% to the overall CSR. Women in Group 10 (women with single cephalic pregnancy <37 weeks' gestation and those with previous CS) contributed 13.7% to the overall CSR.

As shown in Table 3, the groups with the highest stillbirth rates were Groups 10 (30.3%), 3 (24.4%), and 8 (16.8%), signifying a high risk for newborn in all preterm cephalic deliveries, all multiple pregnancies, and multiparous single cephalic neonates delivered at term, respectively ($P < 0.001$). The babies born to the women in Groups 5, 10, and 1 contributed 29.7%, 17%,

and 16.6% to the total number of newborns with Apgar score <7 at the 5th minute.

Discussion

Our study showed that women in Groups 5, 1, and 10 were the main contributors to the overall CSR at the UCH, Ibadan. Those in Group 5 were pregnant women with a single foetus in cephalic presentation and previous CS; they accounted for the fact that the majority of those who had CS were in the study period. Our findings are in keeping with studies in tertiary hospitals in India and Pakistan in which a majority of the pregnant women who had a CS were those in Group 5.^[20,21] Similarly, the secondary analysis of two WHO multi-country surveys in 2015 revealed that in countries with low Human Development Index like Nigeria, women in Group 5 had the highest caesarean rate.^[22] However, a study in Egypt that analysed the CSR using the standard 10-Group Robson classification system revealed that women in Groups 5, 6, and 10 had the highest caesarean rates.^[23] Also, in a population-based birth cohort study at Gaza, most of the women who had CS were multiparous with a single, cephalic, term pregnancy and at least one CS (Group 5), women with multiple pregnancies (Group 8), and those with single cephalic preterm pregnancies (Group 10).^[24]

Contrastingly, a retrospective study conducted in Tanzania reported that about 90% of women admitted for labour were in similar study, which used the same classification system Robson Groups 1 through 5 and more than 40% of the CS carried out were performed on nulliparous women at term with a single foetus in cephalic presentation (Groups 1 and 3).^[17] In South Africa, a review in a rural district hospital showed Groups 1, 10, and 5 as the leading contributors of CSR. It was revealed that most of the caesarean deliveries done were due to foetal distress and cephalopelvic disproportion in Group 1 women.^[25] In a similar study that used the classification system in Ekiti, Nigeria, it was reported that women in Group 1 had the highest contribution to the CSR.^[26]

The RTGCS has been used in developed countries. In Europe and Canada, women in Group 5 were usually among the three highest contributors to the CSR.^[2,27] Le Ray *et al.*^[2] in France

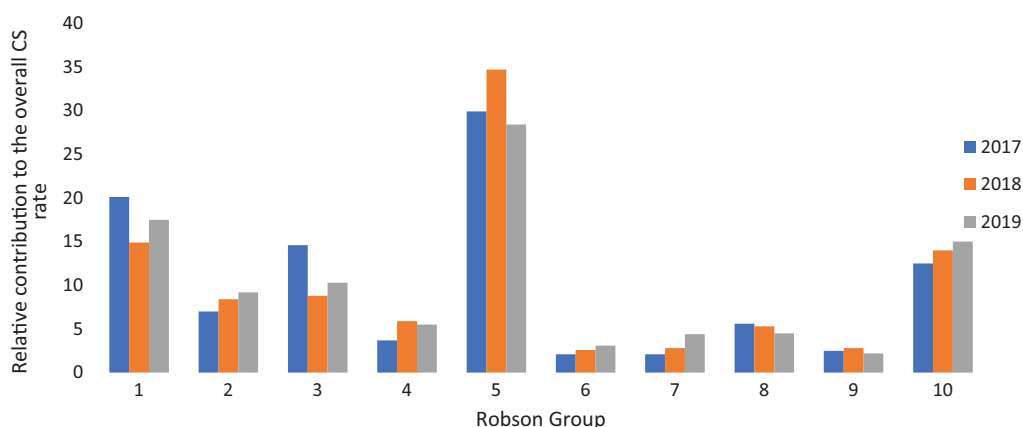


Figure 1: The trend in caesarean section according to the Robson TGCS during the period reviewed

Table 2: Robson 10-group classification of women who had Caesarean section

Group	Description	Number of women in group (n=2673)	Relative contribution by each group to the overall CSR	Number in each group in 2017 (n=1055)	Relative contribution by each group to the CSR in 2017	Number in each group in 2018 (n=799)	Relative contribution by each group to the CSR in 2018	Number in each group in 2019 (n=819)	Relative contribution by each group to the CSR in 2019
1	Nulliparous, single cephalic, >37 weeks, spontaneous labour	474	17.73%	212	20.10%	119	14.9%	143	17.46%
2	Nulliparous, single cephalic, >37 weeks, induced or pre-labour CS	216	8.08%	74	7.01%	67	8.4%	75	9.16%
3	Multiparous, single cephalic, >37 weeks, spontaneous labour (excluding previous CS)	308	11.52%	154	14.60%	70	8.8%	84	10.26%
4	Multiparous, single cephalic, >37 weeks, induced or pre-labour CS (excluding previous CS)	131	4.90%	39	3.70%	47	5.9%	45	5.50%
5	Previous CS, single cephalic, >37 weeks	825	30.86%	315	29.90%	277	34.7%	233	28.45%
6	All nulliparous breeches	68	2.54%	22	2.09%	21	2.6%	25	3.05%
7	All multiparous breeches (including previous CS)	80	3.00%	22	2.09%	22	2.8%	36	4.40%
8	All multiple pregnancies (including previous CS)	138	5.16%	59	5.60%	42	5.3%	37	4.51%
9	All transverse or oblique lies (including previous CS)	66	2.47%	26	2.50%	22	2.8%	18	2.20%
10	All preterm single cephalic, <37 weeks, (including previous CS)	367	13.73%	132	12.51%	112	14.0%	123	15.01%
	Total	2673	100%	1055	100%	799	100%	819	100%

CS – Caesarean section; CSR – Caesarean section rate

found that the nulliparous women with term pregnancies in spontaneous labour (Group 1) and the multiparous women with previous CS (Group 5) contributed the most. In Canada, a quality improvement exercise identified Robson Group 5 as the highest contributor to the increasing CSR, whereas Groups 2 and 1 were second and third, respectively.^[27] The difference in the pattern of the risk group that has the highest contribution to CSR across countries might be due to case mix, popularity and acceptability of CS among women, increase in non-medically indicated CS, intolerance of adverse outcome related to vaginal delivery, and fear of litigation which differs from country to country.^[22,28]

To reduce CSR, there is need for the promotion of vaginal birth after CS in carefully selected patients.^[4] It should be noted that when using the standard RTGCS, women in some groups may benefit from subclassification. For instance, women in Group 5 (previous CS, single cephalic, ≥ 37 week) are categorized regardless of the timing of CS (pre-labour or in labour) or the number of previous CS.^[5] This classification does not consider some other obstetric details: some of the women in this group may have had an iatrogenic delivery as a result of a co-existing morbidity which may be unavoidable. This and other possible confounders have also been previously highlighted.^[25]

Table 3: Stillbirth and Apgar <7 at 5 min for neonates following caesarean section

Group	Description	Stillbirth in each group (% of total stillbirth)	Apgar <7 at 5 min in each group (% of total Apgar <7 at 5 min)
1	Nulliparous, single cephalic, >37 weeks, spontaneous labour	10 (8.4)	38 (16.6)
2	Nulliparous, single cephalic, >37 weeks, induced or pre-labour CS	5 (4.2)	27 (11.8)
3	Multiparous, single cephalic, >37 weeks, spontaneous labour (excluding previous CS)	29 (24.4)	17 (7.4)
4	Multiparous, single cephalic, >37 weeks, induced or pre-labour CS (excluding previous CS)	3 (2.5)	8 (3.5)
5	Previous CS, single cephalic, >37 weeks	10 (8.4)	68 (29.7)
6	All nulliparous breeches	2 (1.7)	5 (2.2)
7	All multiparous breeches (including previous CS)	1 (0.8)	9 (3.9)
8	All multiple pregnancies (including previous CS)	20 (16.8)	13 (5.7)
9	All transverse or oblique lies (including previous CS)	3 (2.5)	5 (2.2)
10	All preterm single cephalic, <37 weeks, (including previous CS)	36 (30.3)	39 (17.0)
	Total	119 (100%)	229 (100%)
	χ^2 (P-value)	1.08 (<0.001)	13.13 (0.157)

In our study, the CSR in 2017 was 53.0% and then it slightly decreased to 52.8% in 2018 before a further decline in 2019 to 37.4%. The decline in 2019 is a positive development that needs to be leveraged on. Reports from the 2018 Nigeria Demographic and Health survey indicate that the southwestern region of the country has the highest CSR in the country.^[10] In addition, previous studies in urban areas within this same region reported CSR of 40.1% and 42.5%.^[9,11] The opposite trend was seen in France; the CSR increased from 15.4% in 1995 to 19.7% in 2003 and then there was a marginal increase to 20.5% in 2010.^[2]

In our study, a high number of women had history of previous CS which is in keeping with a previous survey in this same facility which showed that previous CS was the most common indication for CS.^[29] However, the indications for the previous CS which could give further information on the need for a repeat CS were not explored. A similar trend was noticed in a tertiary hospital in South East Nigeria.^[30] Also, in Tanzania, it was reported that 4 in 10 women who had CS had a previous uterine scar.^[17] With appropriate patient selection, offering vaginal birth after caesarean (VBAC) section is an effective strategy to reduce the rising CSR.^[31]

During the period of the study, 119 (4.5%) stillbirths were recorded mainly in Groups 10 (30.3%) and 3 (24.4%). This implies that babies born to women with single cephalic preterm gestations and multiparas with single cephalic term gestation in spontaneous labour had the highest number of stillbirths. Furthermore, Apgar score <7 was predominant in babies whose mothers were in Group 5 (single, cephalic, term pregnancy with previous CS) and Group 10 (single, cephalic, preterm pregnancy) though not significant. In Tanzania, being born to women in Groups 9 and 3 was associated with an increased risk of stillbirth and Groups 1 and 10 for Apgar <7.^[17]

There were number of limitations to this study. The data were collected retrospectively from handwritten records where some of the information on vaginal delivery had not been recorded accurately. The available data also limited the neonatal outcomes we assessed; we could not also analyse and calculate the perinatal mortality. The RTGCS is a validated tool that has been used for auditing and analysing CSR in many countries. However, this tool has been largely unutilized in Nigeria. In addition to analysing CSR, we used this classification system to identify groups of women whose babies were born with Apgar score <7 and whose deliveries resulted in stillbirth. The findings will help design a prospective multi-center study to analyse the group(s) of women most likely to have abdominal delivery, VBAC rates, and adverse neonatal outcomes across each group.

We recommend that primary CS be based on merit as a way of reducing the CSR directly. This should subsequently reduce the proportion of women with previous CS (the group identified as the major influence to rising incidence of CS). When the number of women with repeat CS decreases, the overall CSR will reduce even further. A careful selection of appropriate women for VBAC delivery is also an effective strategy to reduce CSR.

Conclusion

There is a high CSR in Ibadan, Nigeria. Using the RTGCS, women in Groups 5 (single, cephalic, term pregnancy with previous CS), 1 (nulliparous, single cephalic, \geq 37 weeks, in spontaneous labour), and 10 [all single cephalic, < 37 weeks (including previous CS)] contributed the most to the overall CSR during the study period.

Furthermore, neonates born by CS to women with a single-term baby in cephalic presentation had the highest risk of Apgar scores <7, whereas stillbirths were the highest with abdominal delivery in women with preterm pregnancies.

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Conflicts of interest

All authors declare no conflict of interest.

Authors' contribution

ADA—study concept; OOB—data analysis; ADA and OOB—study design, literature search, data acquisition, manuscript preparation, manuscript editing, and manuscript review.

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